



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:  
Tepman et al.

Serial No.: 09/451,628

Filed: November 30, 1999

For: Integrated Modular Processing  
Platform

§  
§  
§  
§  
§  
§  
§  
§  
§

Group Art Unit: 1763

Examiner: L. ALEJANDRO

Confirmation No. 9301

Assistant Commissioner for Patents  
Washington, D.C. 20231

Dear Sir:

CERTIFICATE OF MAILING 37 CFR 1.8	
I hereby certify that this correspondence is being deposited on October 29, 2002, with the United States Postal Service as First Class Mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231.	
Oct 29, 2002 Date	<i>Robert D. Edwards</i> Signature

**APPEAL BRIEF**

Applicants submit this Appeal Brief to the Board of Patent Appeals and Interferences on appeal from the decision of the Examiner of Group Art Unit 1763 dated January 14, 2002, finally rejecting claims 1, 8, 11-16, 18-22, and 28-29. Please charge the fee of \$320.00 for filing this brief to Deposit Account No. 20-0782/APPM/4285.X1/BTP. Three copies of this brief are submitted for use by the Board.

**Real Party in Interest**

The present application has been assigned to Applied Materials, Inc., 3050 Bowers Avenue, Santa Clara, California 95054.

**Related Appeals and Interferences**

Applicants assert that no other appeals or interferences are known to the Applicants, the Applicants' legal representative, or assignee that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

### **Status of Claims**

Claims 1, 8, 11-16, 18-22, and 28-29 are pending in the application. Claims 1-6 were originally presented in the application. Claims 7-27 were submitted in a response to office action mailed by Applicants on March 3, 2001. Claims 4, 5, 9, 10, 17, and 23-27 were cancelled without prejudice, and new claims 28-29 were submitted in a response to office action mailed by Applicants on November 8, 2001. Claims 2, 3, and 6 were withdrawn by the Examiner in an office action dated January 14, 2002. Claim 7 was cancelled without prejudice in a response to office action mailed by Applicants on March 12, 2002. The rejection of claims 1, 8, 11-16, 18-22, and 28-29 based on the cited references is appealed. The pending claims are shown in the attached Appendix.

### **Status of Amendments**

The claims in the Appendix include amendments presented in a response to Final office action mailed by Applicants on March 12, 2002, which have been entered by the Examiner. Applicants submitted amendments to claims 1, 8, 12, 28, and 29 to more clearly recite aspects of the invention and to place claims 8 and 12 in independent form in a response to Final office action mailed by Applicants on June 21, 2002. The Examiner did not enter these amendments for reasons that the Examiner thought the amendments raised new issues for consideration or would require a new search.

### **Summary of Invention**

In the fabrication of integrated circuits and other electronic devices, including flat panel displays, vacuum processing systems are conventionally used to deposit and remove various conductive, semiconductive and dielectric materials onto and from substrates. (See, specification at page 2, lines 10-13.) A typical vacuum processing system includes one or more front-end load lock chambers, at least one transfer chamber, and one or more processing chambers. These systems have typically been manufactured to perform a specified processing sequence. As a result, these systems are not easily reconfigured as processing sequences change or new processes develop.

In the assembly of these systems, the common fabrication utilities, e.g., the process gases, the helium supply and return, the system exhaust, the electrical power, etc., are distributed to each chamber on the vacuum processing system from a remote location within the fabrication facility. As a result, the utility connections from each chamber are connected directly to the remote location having the utilities supply. This results in complicated plumbing lines being installed on the system that are difficult to remove and difficult to re-configure to accommodate different chambers at different positions on the system. (See, specification at page 3, line 20 through page 4, line 2.) There is a need, therefore, for a modular vacuum processing system that could be easily reconfigured to accommodate a particular processing sequence and which could be more easily installed in a fabrication facility. (See, specification at page 5, lines 14-15.)

In one aspect, the present invention generally provides a processing system and modular components thereof. In one embodiment, the processing system includes a transfer chamber, one or more load lock chambers connected to the transfer chamber, one or more process chambers connected to the transfer chamber, a plumbing tray disposed adjacent the transfer chamber and having facility connections for each process chamber and each load lock chamber, and a chamber tray disposed adjacent each process chamber, each load lock chamber and each transfer chamber. The chamber tray has facility connections connectable with the facility connections on the plumbing tray. (See, specification at page 5, lines 19-28.)

One major advantage to this system is that a user may change a processing sequence by simply moving positions of the one or more processing chambers about the transfer chamber. To accomplish this, a respective chamber tray and process chamber are disconnected from a current position and reconnected at a new position without re-engineering or re-plumbing the process utilities connected to the process chamber via the chamber tray. The process utilities are not affected since the utility supply lines are available from the plumbing tray at each position on the transfer chamber.

In addition to the ability to easily reconfigure the chambers on the processing system, another advantage of the processing system is overall simplicity in

manufacturing. Assembly procedures for conventional processing systems usually involve serially assembling one set of components, testing those components and then assembling and testing the next set of components, and so on until all components have been assembled and tested. Integration of the individual components does not occur until each individual set of components has been assembled and tested, thereby increasing manufacturing time.

In contrast, the modular design of the claimed system allows separate portions of the system to be assembled and tested in parallel. For example, the mainframe, transfer chamber, process chambers, mainframe plumbing tray and chamber trays may each be assembled and tested individually. After testing, integration of the separate modules is simple. The mainframe plumbing tray is inserted into the mainframe. The chamber trays are attached to the mainframe. The transfer chamber is attached to the mainframe and the individual process chambers are attached to the mainframe. Finally, the facility connections are made between each chamber interface and its respective chamber tray and between each chamber tray and the mainframe plumbing tray. (See, specification at page 27, line 29 through page 28, line 14). The system then is ready for use.

#### Issues Presented

1. Whether the Examiner erred in rejecting claims 1, 11, 13-15, 18-20, and 28-29 under 35 U.S.C. § 102(b) as being anticipated by *Rubin et al.* (U. S. Patent No. 4,852,516).
2. Whether the Examiner erred in rejecting claim 28 under 35 U.S.C. § 102(b) as being anticipated by *Rubin et al.* (U. S. Patent No. 4,852,516).
3. Whether the Examiner erred in rejecting claims 1, 11, 13-16, 18, and 28 under 35 U.S.C. § 102(e) as being anticipated by *Lei et al.* (U. S. Patent No. 6,083,321).
4. Whether the Examiner erred in rejecting claims 8 and 12 under 35 U.S.C. § 103(a) as being unpatentable over *Lei et al.* (U. S. Patent No. 6,083,321)

5. Whether the Examiner erred in rejecting claims 21-22 under 35 U.S.C. § 103(a) as being unpatentable over *Rubin et al.* (U. S. Patent No. 4,852,516).

### Grouping of Claims

Claims 1, 11, 13-16, 18-22, and 29 stand or fall together, and claim 1 is representative of Applicants' argument. Claims 8 and 12 stand or fall together and claim 8 is representative of Applicants' argument. Claim 28 stands or falls alone, and is argued independently. Claims 21-22 stand or fall together and claim 22 is representative of Applicants' argument.

### ARGUMENT

1. THE EXAMINER ERRED IN REJECTING BASE CLAIMS 1, 11, 13-15, 18-20, 28, AND 29 BECAUSE *RUBIN ET AL.* DOES NOT TEACH OR SUGGEST A PLUMBING TRAY DISPOSABLE ADJACENT A TRANSFER CHAMBER AND HAVING FACILITY CONNECTIONS FOR EACH PROCESS CHAMBER AND LOAD LOCK CHAMBER, AND A CHAMBER TRAY DISPOSABLE ADJACENT EACH PROCESS CHAMBER, LOAD LOCK CHAMBER AND TRANSFER CHAMBER IN FLUID COMMUNICATION WITH THE FACILITY CONNECTIONS OF THE PLUMBING TRAY.

Claims 1, 11, 13-15, 18-20, and 28-29 stand rejected under 35 U.S.C. § 102(b) as being anticipated by *Rubin et al.* (U. S. Patent No. 4,852,516). The Examiner states that "*Rubin et al.* shows the invention as claimed including a multi-chamber apparatus for processing substrates including initial load lock chamber for storage 102 connected to a multitude of process chambers 100 each chamber including a modular plumbing tray 172 and a chamber tray." The Examiner also asserts that "any of the individual process chambers 100 of *Rubin et al.* can be considered a 'transfer chamber' since the wafer is physically being moved from one side to the other."

**A. RUBIN ET AL. DOES NOT TEACH OR SUGGEST A PLUMBING TRAY.**

Applicants respectfully traverse the rejection on grounds that *Rubin et al.* does not teach or suggest a transfer chamber comprising one or more process access ports; one or more load lock chambers disposable about the transfer chamber; one or more process chambers disposable about the transfer chamber; a plumbing tray disposable adjacent the transfer chamber and having facility connections for each process chamber and load lock chamber; and a chamber tray disposable adjacent each process chamber, load lock chamber and transfer chamber, the chamber tray in fluid communication with the facility connections of the plumbing tray, wherein each process chamber is disposable on each chamber tray, as recited in claim 1.

More specifically, *Rubin et al.* does not teach or suggest a plumbing tray disposable adjacent a transfer chamber. *Rubin et al.* discloses a processing apparatus 100, each consisting of a processing module 176 disposed on a movable chassis 102. The processing apparatus 100 receives process facilities from a plurality of service facilities extending through a service conduit 172 formed within a floor of the processing room. (See, *Rubin et al.* at col. 6, lines 15-20 and at Figure 7.) The plumbing tray, as claimed and described in the Applicants' specification, is a tray disposable adjacent a transfer chamber, not a service conduit disposed on a floor as asserted by the Examiner.

**B. RUBIN ET AL. DOES NOT TEACH OR SUGGEST CHAMBER TRAYS IN FLUID COMMUNICATION WITH THE FACILITY CONNECTIONS OF A PLUMBING TRAY.**

*Rubin et al.* also does not teach or suggest a chamber tray disposable adjacent each process chamber, load lock chamber and transfer chamber, wherein the chamber trays are in fluid communication with the facility connections of the plumbing tray, as recited in claim 1. *Rubin et al.* discloses a facility docking subassembly 104 installed above the service conduit 172. The facility docking subassembly 104 is stationery. (See, *Rubin et al.* at col. 6, lines 12-28). The processing apparatus 100 is moved from a remote location to a location overlying the stationery service facility docking

subassembly 104 and the two are inter-connected. The stationery facility docking subassembly 104 passes the service facilities from the service conduit 172 to the processing apparatus 100 using docking plates 114 and 158 that are inter-connectable to provide facilities there-through. (See, *Rubin et al.* at col. 5, lines 55-67.)

Accordingly, *Rubin et al.* does not teach or suggest a chamber tray disposable adjacent each process chamber, load lock chamber and transfer chamber, wherein the chamber trays are in fluid communication with the facility connections of the plumbing tray, as recited in claim 1. As discussed above, each facility docking subassembly 104 shown in *Rubin et al.* is not a chamber tray as recited in the claim 1, and is not in fluid communication with a plumbing tray.

**C. RUBIN ET AL. DOES NOT TEACH OR SUGGEST A TRANSFER CHAMBER.**

Applicants traverse the Examiner's assertion that "any of the individual process chambers 100 of *Rubin et al.* can be considered a 'transfer chamber' since the wafer is physically being moved from one side to the other." The Examiner stated that *Rubin et al.* teaches (in Figure 7) a coating chamber "in which it is clear that the wafer 188 can be transferred from one side to another using an arm 180." The Examiner states that this coating chamber "can be broadly considered a transfer chamber."

Applicants respectfully traverse the rejection. The Examiner has loosely misapplied the definition of a "transfer chamber" as it is known and used in the art. A transfer chamber is not merely a transporting mechanism 178 as suggested by the Examiner. A transfer chamber is an enclosure containing one or more transfer robots and one or more orientation stations that are isolated from adjoining load lock chamber and process chambers via access ports and slit valves. (See, specification at page 11, line 12, through page 13, line 11 and at Figure 4A.)

Furthermore, assuming the coating chamber doubles as transfer chamber sandwiched between two processing chambers, as the Examiner asserts, the Examiner still has not shown that *Rubin et al.* discloses one or more load lock chambers disposable about the transfer chamber, as recited in claim 1. As shown in Figure 7, the

"load lock" chambers of *Rubin et al.* are not disposed about the "coating chamber" or transfer chamber as referred to by the Examiner.

**2. THE EXAMINER ERRED IN REJECTING CLAIM 28 BECAUSE *RUBIN ET AL.* DOES NOT TEACH OR SUGGEST EACH PROCESS CHAMBER AND EACH CHAMBER TRAY FORMING A MODULAR UNIT.**

Applicants respectfully traverse the rejection on grounds that *Rubin et al.* does not teach or suggest each process chamber and each chamber tray forming a modular unit, as recited in claim 28. As mentioned above, *Rubin et al.* teaches a processing apparatus 100 that is movable over a stationery facility docking subassembly 104. The docking subassembly 104 does not move together with the processing chamber 176 disposed on the chassis 102 of the processing apparatus 100 and therefore, does not form a modular unit with the processing chamber 176. Accordingly, withdrawal of the rejection and allowance of claim 28 and those dependent therefrom is respectfully requested.

**3. THE EXAMINER ERRED IN REJECTING CLAIMS 1, 11, 13-16, 18, AND 28 BECAUSE *LEI ET AL.* DOES NOT TEACH OR SUGGEST A PLUMBING TRAY DISPOSABLE ADJACENT THE TRANSFER CHAMBER AND HAVING FACILITY CONNECTIONS FOR EACH PROCESS CHAMBER AND LOAD LOCK CHAMBER; AND A CHAMBER TRAY DISPOSABLE ADJACENT EACH PROCESS CHAMBER, LOAD LOCK CHAMBER AND TRANSFER CHAMBER.**

Claims 1, 11, 13-16, 18 and 28 stand rejected under 35 U.S.C. § 102(e) as being anticipated by *Lei et al.* (U. S. Patent No. 6,083,321). The Examiner states that "*Lei et al.* shows the invention as claimed including a transfer chamber 90, a modular plumbing tray 10 adjacent the transfer chamber and having connections from the facility to the process chambers 30, and a chamber tray adjacent the one or more process chambers including an injection control valve 18". The Examiner further states that the chamber tray has facility connections connected to one or more of the facility connections in the plumbing tray.

Applicants respectfully traverse the rejection. *Lei et al.* teaches a gas delivery system 10 that is attached to a process chamber 30. (See, *Lei, et al.* at col. 2, line 66



through col. 3, line 7.) *Lei et al.* does not teach or suggest a plumbing tray disposable adjacent a transfer chamber and having facility connections for each process chamber and each load lock chamber, as recited in claims 1 and 28. *Lei et al.* also does not teach or suggest a chamber tray disposable adjacent each process chamber, each load lock chamber and the transfer chamber, each chamber tray being in fluid communication with the facility connections of the plumbing tray, as recited in claims 1 and 28. Withdrawal of the rejection is respectfully requested.

In further support of the Applicants' traversal, the Examiner states that *Lei, et al.* shows "a modular plumbing tray 10 adjacent the transfer chamber and having connections from the facility to the process chambers 30". (emphasis added) Accordingly, *Lei, et al.* does not teach or suggest chamber trays in fluid communication with the facility connections of the plumbing tray, as recited in claims 1, 28, and 29 and those dependent therefrom. Withdrawal of the rejection is respectfully requested.

**4. THE EXAMINER ERRED IN REJECTING CLAIMS 8 AND 12 UNDER 35 U.S.C. § 103(A) BECAUSE *LEI ET AL.* IS A COMMONLY ASSIGNED 35 U.S.C. §102(E) REFERENCE THAT MAY NOT PRECLUDE PATENTABILITY UNDER §103 OBVIOUSNESS.**

Claims 8 and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Lei et al.* (U. S. Patent No. 6,083,321). Applicants respectfully traverse the rejection on grounds that *Lei et al.* (U. S. Patent No. 6,083,321) is prior art under 35 U.S.C. §102(e). Prior art under 35 U.S.C. §102(e) may not preclude patentability under §103. (See, 35 U.S.C. §103(c).) Both *Lei et al.* and the claimed subject matter were, at the time the invention was made, subject to an obligation of assignment to Applied Materials, Inc., the assignee of both *Lei et al.* and the present application. Accordingly, the rejection is improper, and withdrawal of the rejection is respectfully requested.

**5. THE EXAMINER ERRED IN REJECTING CLAIMS 21-22 UNDER 35 U.S.C. § 103(A) BECAUSE *RUBIN ET AL.* DOES NOT TEACH OR SUGGEST A TRANSFER CHAMBER COMPRISING AT LEAST ONE LIFT, THE LIFT COMPRISING A SUPPORT SHAFT, PEDESTAL, LIFT ASSEMBLY, AND ROTATIONAL ASSEMBLY.**

Claims 21-22 stand rejected under 35 U.S.C. § 103(a) as being anticipated by *Rubin et al.* (U. S. Patent No. 4,852,516). The Examiner states that *Rubin et al.* "lacks anticipation of the particular wafer handling means including a lift and a pedestal." The Examiner further states that "these are well known types of wafer handling techniques and would have been obvious to implement in the primary reference of *Rubin et al.*"

Applicants respectfully traverse the rejection on grounds that the Examiner has not established a *prima facie* case of obviousness. To establish *prima facie* obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. See *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). Further, the teaching or suggestion to make the claimed invention and the reasonable expectation of success must both be found in the prior art, not in the applicants' disclosure. See M.P.E.P. § 2143, citing *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991).

The Examiner's statement that "these are well known types of wafer handling techniques and would have been obvious to implement in *Rubin et al.*" is merely an unsupported conclusion that the combined elements provide an obvious result. Unsupported legal conclusions and impermissible hindsight may not provide a proper basis to support a rejection based on *prima facie* obviousness. Therefore, the Examiner erred in rejecting the claims under 35. U.S.C. §103(a) as being unpatentable over *Rubin et al.*

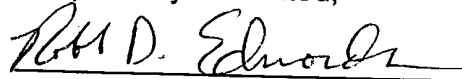
Furthermore, claims 21-22 depend from claim 1 and thus, are patentable for at least the same reasons. As discussed above, *Rubin et al.* does not teach or suggest a plumbing tray and a chamber tray disposable adjacent each process chamber, load lock chamber and transfer chamber, wherein the chamber trays are in fluid communication with the facility connections of the plumbing tray, as recited base claim 1. *Rubin et al.* also does not teach or suggest a plumbing tray disposable adjacent the transfer chamber and having facility connections for each process chamber and load lock

chamber, as recited in claim 1. Accordingly, withdrawal of the rejection and allowance of the claims is respectfully requested

### Conclusion

The references alone or in combination do not motivate or suggest the claimed invention. Specifically, the references do not motivate or suggest a plumbing tray or a transfer chamber, as recited in the claims. The references also do not motivate or suggest chamber trays in fluid communication with a plumbing tray, as recited in the claims. Withdrawal of the rejections and allowance of claims 1, 8, 11-16, 18-22, and 28-29 is respectfully requested.

Respectfully submitted,



Robb D. Edmonds  
Registration No. 46,681  
Moser, Patterson & Sheridan, L.L.P.  
3040 Post Oak Blvd., Suite 1500  
Houston, TX 77056  
Telephone: (713) 623-4844  
Facsimile: (713) 623-4846  
Attorney for Applicant(s)

## APPENDIX

The pending claims are as follows:

1. An apparatus for processing substrates, comprising:
  - a) a transfer chamber comprising one or more process access ports;
  - b) one or more load lock chambers disposable about the transfer chamber;
  - c) one or more process chambers disposable about the transfer chamber;
  - d) a plumbing tray disposable adjacent the transfer chamber and having facility connections for each process chamber and load lock chamber; and
  - e) a chamber tray disposable adjacent each process chamber, load lock chamber and transfer chamber, the chamber tray in fluid communication with the facility connections of the plumbing tray, wherein each process chamber is disposable on each chamber tray.
8. The apparatus of claim 1, wherein the transfer chamber comprises at least six process access ports.
11. The apparatus of claim 28, wherein the modular unit is mounted to the transfer chamber at the access port.
12. The apparatus of claim 1, wherein the chamber tray is mounted separately to the transfer chamber.
13. The apparatus of claim 1, wherein the process chamber and the chamber tray are mounted to a support frame.
14. The apparatus of claim 13, wherein the support frame comprises rollable support members.

15. The apparatus of claim 1, wherein the chamber tray comprises an enclosure having one or more selected from the group consisting of a pneumatic distribution manifold, process gas manifold, vacuum manifold, water manifold, and helium manifold.
16. The apparatus of claim 15, wherein the enclosure comprises a plurality of facility connections disposed thereon that are in fluid communication with the facility connections of the plumbing tray.
18. The apparatus of claim 1, wherein the transfer chamber comprises at least one transfer means for moving work pieces to and from the load lock and process chambers.
19. The apparatus of claim 18, wherein the transfer means is a robot.
20. The apparatus of claim 19, wherein the transfer chamber comprises two transfer robots.
21. The apparatus of claim 20, wherein the transfer chamber further comprises at least one lift, the lift comprising a support shaft, pedestal, lift assembly, and rotational assembly.
22. The apparatus of claim 21, wherein the lift is rotatable to maintain an orientation of the work pieces as the work pieces pass between the transfer robots.
28. An apparatus for processing substrates, comprising:
  - a) a transfer chamber comprising one or more process access ports;
  - b) one or more load lock chambers disposable about the transfer chamber;
  - c) one or more process chambers disposable about the transfer chamber;
  - d) a plumbing tray disposable adjacent the transfer chamber and having facility connections for each process chamber and load lock chamber; and

e) a chamber tray disposable adjacent each process chamber, load lock chamber and transfer chamber, wherein the chamber tray is in fluid communication with the facility connections of the plumbing tray, and wherein each process chamber and each chamber tray form a modular unit.

29. An apparatus for processing substrates, comprising:

- a) a transfer chamber comprising one or more process access ports;
- b) one or more load lock chambers disposable about the transfer chamber;
- c) one or more process chambers disposable about the transfer chamber;
- d) a plumbing tray disposable underneath the transfer chamber having facility connections for each process chamber and load lock chamber; and
- e) a chamber tray disposable adjacent each process chamber, load lock chamber and transfer chamber, the chamber tray in fluid communication with the facility connections of the plumbing tray.